29th its center was but a short distance south southeast of the mouth of the Mississippi River whence it moved northeastward, crossed the coast line near Cedar Keys, Fla., and then moved northeastward along the coast and reached New England during the night of the 30th. For a detailed report of this disturbance see page 524, above.

Lows.

	Alberta.	Northern Pacific.	Southern Pacific.	Northern Rocky Mountain.	Colorado.	Texas.	East Gulf.	South Atlantic.	Central.	Total.
September, 1920..	5.0	2.0	2.0	0.0	0.0	0.0	3.0	1.0	1.0	14.0
Average number, 1892-1912.....	4.1	1.0	0.4	0.6	0.7	0.3	0.3	0.2	0.7	8.5

Highs.

	Northern Pacific.	Southern Pacific.	Alberta.	Plateau and Rocky Mountain Region.	Hudson Bay.	Total.
September, 1920.....	2.0	0.0	4.0	2.0	2.0	10.0
Average number, 1892-1912.....	2.0	1.0	3.5	0.7	0.6	7.9

THE WEATHER ELEMENTS.

By P. C. DAY, Climatologist and Chief of Division.

[Weather Bureau, Washington, D. C., Nov. 1, 1920.]

PRESSURE AND WINDS.

The variations in atmospheric pressure during September were much better defined than those of the preceding month. In fact, there were several phases of the pressure distribution that attained unusual proportions. A notable high area overspread the northern districts during the first few days of the month, and frequent changes from high to low were observed thereafter. At the end of the month, some of the lowest pressure readings ever observed were recorded at points along the New England Coast.

Two tropical hurricanes entered the Gulf States during the month. The first approached the coast to westward of the mouth of the Mississippi River the night of the 21st–22d and moved during the following day or two as far north as Iowa. The second moved over the Florida Peninsula the night of the 29th–30th and during the following day advanced along the Atlantic coast, causing record-breaking low-pressure readings; and high winds at a few points. More complete details of these storms will appear in another portion of the REVIEW.

For the month as a whole, pressure averages were below normal in all portions of the United States and Canada save along the California coast, where they were slightly above normal. Over the United States the departures were usually small, but in the Canadian Northwest and over the Maritime Provinces they were of considerable extent.

The pressure distribution favored southerly winds over the central valleys, Lake region, and Great Plains, but along the Atlantic coast they were frequently from the northeast, while westerly winds prevailed as usual over the Pacific Coast States.

The general circulation of the atmosphere was not such as to induce high winds, save in connection with the two Gulf storms, and in these cases the wind velocities were mainly high only as they approached the land.

TEMPERATURE

The month as a whole was free from marked temperature changes and only in restricted areas were the extremes of former years equaled. The early part of the month was generally cool over the districts from the Rocky Mountains eastward, and by the end of the first decade cool weather for the season had overspread the far western States. At the same time, however, there was a gradual return to warmer weather over the eastern districts. The middle decade of the month was very generally warmer than normal from the Rocky Mountains eastward, particularly over the Great Plains and central valleys, where warmer weather and sunshine were much needed to bring the late crops, particularly corn, to proper maturity. However, near the end of the decade cooler weather overspread the northern districts from the Great Lakes eastward, and frosts, mostly light, occurred as far south as New Jersey and eastern Pennsylvania.

During the early part of the third decade, warm weather still continued over the principal corn-growing States of the Middle West, but from the Rocky Mountains westward it was mainly cool, particularly about the Middle of the decade, when frosts and freezing weather overspread large areas, and the lowest temperatures ever observed in September were reported from points in Utah and Nevada. Toward the end of the last decade high pressure moved into the northwestern districts from Canada, accompanied by freezing temperatures, and by the morning of the 29th had overspread the Great Plains and central valleys, causing the first severe frost of the season as far south as Kansas. During the closing days of the month the cool area extended into the Gulf States, giving the lowest temperatures for September in a period of 50 years at points in Alabama and other Southern States, and killing frosts extended to Oklahoma, the upper Mississippi Valley, and into the Great Lakes region.

Maximum temperatures above 90° were reported in all the States and they were 100° or above in many of the Southern and Western States. Over the Southeastern States and to westward of the Rocky Mountains the warmest period was near the beginning of the month. Over the remaining districts the warmest days were during the second decade except in the Northeastern States where they occurred near the middle of the last 10-day period.

The lowest temperatures of the month occurred on the last two days, except in the far West where they occurred a few days earlier, and over the Northeastern States where the coldest period was about the 20th.

The average temperature for the month was above normal, though not materially so, over all districts from the Rocky Mountains eastward. In portions of the Ohio Valley and adjacent regions, September was the first month since March with average temperature above the normal. The change to warmer weather during this month was of untold benefit in bringing crops to maturity before the usual period of frost.

West of the Rocky Mountains the monthly averages were mostly below normal, particularly in the Plateau region, where cold weather persisted for long periods.

PRECIPITATION.

Thunderstorm activity was the source of much of the rainfall during the month, and as a result great variations occurred in the amounts received at near-by stations.

The first half of the month was distinctly rainy over the central valleys and southern districts, although periods

with precipitation were not long continued over any extensive areas, nor were the storm movements usually continuous in any particular direction.

Precipitation was fairly general, and in many cases heavy, over most southern States from the 2d to the 4th, extending during the 5th and 6th into the Ohio Valley and adjacent regions and later into New England. Important rains occurred on the 7th and 8th in the Plains States and Rocky Mountain region, and these gradually overspread the central valleys and eastern districts on the 9th and 10th. During this rainy period some unusually heavy falls were reported, notably at Memphis, Tenn., where from the 7th to the 10th the precipitation amounted to nearly 8 inches. Numerous thunderstorms occurred from the 11th to the 13th over an extensive area from the middle Mississippi Valley northeastward to New England, and about the same time rains set in over the far Northwest, some heavy falls occurring near the coast of Oregon and Washington. On the night of the 15th–16th thunderstorms were numerous over considerable areas in the Ohio Valley and to the northward, and locally in Florida and other portions of the South.

In the Rocky Mountain and Great Plains districts rains had very generally ceased by the 12th, and within the following few days clear weather extended into most eastern sections, and but little additional rain occurred in any district until after the end of the second decade. During the night of the 21st–22d a tropical storm approached the Gulf coast somewhat west of the mouth of the Mississippi River, and during the following day or two moved northward, accompanied by rather general rains over a somewhat narrow area. At the same time precipitation set in over the far Northwest and, moving eastward, appears to have united with the southern storm, and rain became general over the greater part of the Missouri and upper Mississippi Valleys on the 23d and 24th. On the latter date some heavy rains were reported rom the Southern States, continuing at intervals and locally for several days, and at the same time rains became general in the far Northwest, extending eastward during the following two or three days along the northern boundary, and developing into an extensive thunderstorm area in the vicinity of the Great Lakes by the morning of the 27th, and extending into the East and South during the following day. Near the end of the month a second tropical storm moved inland from the Gulf, passing over the Florida Peninsula and thence northward along the coast during the 29th and 30th. This storm gave heavy rains over the coast States from Florida to New England, high tides along the Florida coast, and unusually low barometer readings and high winds near the southern New England coast.

Total falls of 10 to nearly 15 inches were reported from many of the southern and eastern States, and in the far Northwest the amounts were in some cases larger, nearly 25 inches being reported from a point in Washington. Over most sections from the Middle Plains eastward the amounts were usually sufficient for present needs. Some heavy rains occurred in Arizona, where but little usually falls during this month, notably in the vicinity of Yuma, where the fall was the heaviest ever recorded in September.

SNOWFALL.

In the mountain sections of the Northwest and at points in the Lake region snow occurred on several dates during the last decade, but the amounts were usually small and soon disappeared.

RELATIVE HUMIDITY.

The average relative humidity was mainly above normal, although there were considerable areas in the vicinity of the Great Lakes and in the Missouri Valley, and local small areas elsewhere that had averages less than normal. The departures either way were usually small except over the northern plateau, where the plus values were locally large.

SEVERE STORMS.

Except in localities affected by the two West Indian hurricanes, high winds were reported usually in connection with local thunderstorms and were confined to small areas.

Near Union, Tenn., a severe storm, probably a tornado, occurred in the afternoon of the 10th. One person was killed and crops and buildings were destroyed or injured to the extent of about $8,000. Near Gouverneur, N. Y., severe thunderstorms on the afternoon of the 12th caused damages to buildings and other property estimated at more than $100,000.

In the vicinity of Providence, R. I., a severe wind and hailstorm occurred on the morning of the 13th. Damage amounting to a million dollars or more was sustained by greenhouse, fruit, truck, and other interests.

At Whitefish Point, Mich., on the southern shore of Lake Superior, a severe storm occurred on the 15th. The wind attained a velocity of about 90 miles per hour, causing much damage to buildings and trees.

At New York City the highest wind ever recorded in September—80 miles per hour—occurred on the 30th in connection with the storm moving up the Atlantic coast at that time.